Department of Agriculture, Trade and Consumer Protection

Division of Marketing

Agricultural Development & Diversification Program (ADD)

1999 Grant Project Final Report

Contract Number: 14005

Grant Project Title: Bottom Draws: Study on the Positive/Negative Effect of Bottom Draws on Commercial Fish Ponds (Year 2)

Project Beginning Date: July 1, 1999 Project End Date: July 1, 2000

Amount of Funding Awarded: $7,100

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ADD Grant Project Final Report

Study on the Positive/Negative Effect of Bottom Draws on Commercial Fish Ponds

Gollon Bait & Fish Farm

1) **Describe the original intent of the grant project.**
   - **How was it projected to benefit Wisconsin Agriculture?**

     This grant intended to benefit Wisconsin Agriculture (Aquaculture) by investigating some effects of a fish farm water effluent discharge on the aquatic environment. Wisconsin water quality regulations need to make sense. We intended to provide scientific findings so that the regulations would make sense. The Wisconsin Department of Natural Resources (WDNR), at the beginning of the grant (1998) was prepared to require Wisconsin fish farms (including Gollon Bait & Fish Farm) to re-engineer all pond drains to be bottom draw. The WDNR did not present scientific evidence to the public to support their proposed, and almost instituted, costly requirement. The cost of re-engineering pond drains to Wisconsin Aquaculture was not assessed by the DNR; however, we placed the estimate of the cost to the aquaculture industry at $1,500,000.

   - **Was it necessary to adjust the objectives during the project?**

     The objectives remained mainly the same throughout the grant. The emphasis was placed on hatchery effluent discharge water quality; water quality of the receiving stream and engineering and construction of a bottom draw drain.

2) **Describe the work conducted in this project**
   - **How did the grant funds assist you in this project?**

     The grant funds allowed us to hire a subcontractor with expertise in fish farm water quality and the funds allowed us to purchase materials and build bottom drain retrofit devices.

   - **What successes did you achieve with this grant project?**

     There were numerous successes with this grant

     - This grant demonstrated to others including fish farmers and regulators that fish are raised on Wisconsin fish farms in an environmentally sound manner.
     - This grant demonstrated that fish farmers support regulations that are based on scientific evidence.
     - This grant demonstrated that one-size fits all water quality regulations don't make sense.
     - This grant demonstrated that fish farmers can teach others including regulators what are sound water management practices.
     - This grant demonstrated aquaculture veterinarians are valuable professionals for fish farm water quality issues.

- This grant demonstrated that fish farmers could build efficient bottom draw retrofit devices for ponds however, the cost may be significant, and the benefits to hatchery effluent questionable.

- **What challenges did you face with your grant project?**

  We were able to complete all the tasks of this grant with very little difficulty. The aquaculture veterinarian, the water quality laboratory, and the sheet metal worker all performed the tasks requested well.

3) Describe the public outreach efforts of this project.

- **What literature or educational materials were produced through this project?**

  Eighty copies of the grant's First Year Summary were distributed to 6th Annual Wisconsin Aquaculture Conference in March 1999 in Green Bay. An additional 10 copies were distributed to individual Wisconsin Department of Natural Resources (WDNR) personnel and 2 copies to University of Wisconsin aquaculture faculty.

- **What presentations, field days or other events were given related to this project?**

  Presentations
  - David Gollon Jr. (Gollon Bait & Fish Farm) and Dr. Myron Kebus (Wisconsin Aquatic Veterinary Service) gave an oral presentation to roughly 300 attendees at the 6th Annual in Wisconsin Aquaculture Conference in March 1999 in Green Bay on the first year findings of this grant.

  Field Days
  - Franc Fenessay. Executive Director of the WDNR April 1999
  - Greg Searle, WDNR June 2000
  - WDNR staff headed by Jerry Rodenberg, June 2000

4) Describe the results of this project

- **Did the grant project results meet your original expectations? Why or why not?**

  Our original expectation was that the effluent from our ponds would not have much of an affect on the water quality of the receiving stream. We were surprised and pleased to find that the water effluent from our farm had extremely little affect on the receiving stream. In fact, we feel much of the findings suggest that our fish farm has a positive affect on the water quality of the receiving stream. Compared with other points where water joins the receiving stream we feel the findings suggest that a fish farm like ours may be a highly favored land use compared to other land uses in Wisconsin.

- **What new agricultural products, technologies or production methods were developed through this project?**

  New Product
  - Prototype bottom draw retro-fit for fish farm pond drains

  New Technologies
  - Prototype aquaculture veterinary water quality services

New Production Methods

- Bottom draw maintenance methods

- **What did you learn from your grant project?**

  - We learned that you need to use science to support water quality regulations.
  - Fish farmer should be involved in water quality issue decision-making.
  - Fish farmers know more about the quality of the water on their farms than most scientists and decision-makers.
  - Science professional, such as aquaculture veterinarians, are a critical asset to fish farmers and the public because they know fish farming.

- **What conclusions can you make?**

  - Wisconsin fish farmers can and should be the primary participants in all fish farm water quality decision-making processes in Wisconsin.

  - Water quality regulations that affect fish farms but are formed without including fish farmers from the beginning are bound to be poor regulations.

  - More testing of water quality from fish farms should be conducted to demonstrate to the public and regulators that fish farming is one of the most favorable land uses in Wisconsin.

- **How will the grant results affect your business?**

  - Because we received this grant the WDNR held off requiring us to needlessly spend the time and money to change all of our fish pond drains.

  - If we did not do this grant there was a strong likelihood that we may have eliminated 11 jobs and moved our business out of state.

  - If we did not do this grant we would have been forced to spend a lot of money with little to no benefit to Wisconsin's environment.

  - The results of this grant will allow us to continue to raise a clean product in a manner that benefits Wisconsin's economy and does not harm the environment.

- **How will this grant project benefit the Wisconsin family farm?**

  - Wisconsin fish farms are family farms.
  - Poor environmental regulations are the number one threat to Wisconsin family fish farms.
  - This project shows that family fish farmers can educate the public and the regulators that fish farming is good for Wisconsin's economy and environment.

- **What impact will this grant project have on the future of Wisconsin agriculture?**

  - This may be the most important aquaculture water quality project conducted in Wisconsin to-date.

- Poor water quality regulations have the potential of crippling Wisconsin aquaculture with no real benefit to Wisconsin's environment or people.

- Fish farmers, regulators, and the public have already felt the impact of this grant in Wisconsin.

5) How will the Wisconsin agriculture industry be able to use the information from this project?

The Wisconsin agriculture industry (aquaculture) already has begun to use the information from this grant to raise important questions about water quality in Wisconsin. Wisconsin will be able to continue to ask the right questions and get the right answers about fish farm water quality by following the principles of involving fish farmers and science professionals that understand fish farming in the process of water quality decision-making.

6) Include any research data that support your conclusions for this project.

There are 117 pages of water quality data that was compiled during this grant. The water quality data includes written documents recording the water test results from Wisconsin Aquatic Veterinary Service, and the laboratory water parameter results from EnChem Laboratories.

There are photographs of the farm, the receiving stream, neighboring streams, and neighboring land. There are aerial photographs of the farm.

There are construction drawings of the bottom draw retrofit, cost figures, and material specifications.

<u>Results and Discussion of the Water Quality Data</u>

The receiving stream, as best as could be determined, is categorized as by the WDNR as a limited fish and aquatic life use water.

Sampling was performed on 26 days over a two-year period (samples were collected either once or twice per month).

Water Temperature Measured Values

Spring	47-50.5^0 F
Hatchery effluent	36-86^0 F
Receiving Stream	39-75^0 F

The range of hatchery effluent temperatures was greater than the range of receiving stream temperatures. However, the hatchery effluent appears largely incapable of altering the receiving stream temperature particularly in the fall, winter and spring. Even in the summer the temperature in the receiving stream was shown to rise by 3 ^{0} F at most in the first 30 feet of the stream. Beyond 30 feet the stream temperature was seen to fall to the temperature 10 feet upstream of where the hatchery effluent meets the stream. The stream showed a relatively large range of temperatures within relatively short distances. There appear to be numerous factors that affect water temperature in the receiving stream: stream width, stream depth, bridge and road structures, and bank plant growth to name a few. There also is evidence that there are factors that are not immediately obvious that affect, often paradoxically stream water temperature.

Months when no temperature affect on stream was seen (temperature 30 feet downstream was unaltered from 10 feet upstream of the point where the Hatchery effluent joined the stream):

January
March
April
May
June
September
October
November
December

Temperature varied in the receiving stream within a stretch less than one-quarter mile downstream. Increase in water temperature downstream as a result of hatchery effluent was apparent up to 30 feet downstream. The greatest water temperature affect was 3^0 F increase associated with use of bottom draw drains.

A spring fed creek that was 2 miles from the hatchery was studied during the warm months. This spring was considered comparable to the spring that originates on the hatchery. Water temperature was seen to rise from 50^0 F to 56^0 F within a 700 foot-stretch.

Values of Other Water Parameters Measured

Parameters measured

Biological Oxygen Demand (BOD)
Total Suspended Solids (TSS)
Ammonia Nitrogen (NH_3-N)
Total Phosphorus.

Biological Oxygen Demand (BOD)

The BOD 5-Day Hatchery Effluent values never exceeded 10 mg/L. There did not appear to be an advantage to the bottom draw opposed to the top draw in regards to this parameter. Neighboring tributaries to the receiving stream showed elevated (far greater than 10 mg/L) BOD 5-Day values.

Total Suspended Solids

In general, the Hatchery Effluent Total Suspended Solid values were lower than the levels in the receiving stream and neighboring tributaries to the stream. There did not appear to be an advantage to the bottom draw opposed to the top draw in regards to this parameter.

Ammonia Nitrogen

The Ammonia Nitrogen values were very low and comparable to the receiving stream values. There did not appear to be an advantage to the bottom draw opposed to the top draw in regards to this parameter.

Total Phosphorus

The Total Phosphorus levels were very low, in fact, below the detectable limit for all days sampled. There did not appear to be an advantage to the bottom draw opposed to the top draw in regards to this parameter.

Chemicals

No chemical treatments of fish or pond were used at the study ponds.

Bottom versus Top Draw Drains

Greatest measured rise in downstream temperature associated with hatchery effluent with a bottom draw was 3^0 F.

Greatest measured rise in downstream temperature associated with hatchery effluent with a top draw was 2^0 F.

Conclusion

This study found that there was no strong scientific evidence to suggest that the hatchery effluent from the commercial fish ponds studied would be improved by drawing water from the bottom of the drain. In fact, bottom draw drains may have a greater affect on increasing receiving stream water temperature on some sites; however, this would require additional study to properly determine. It may be unsound, expensive, and ineffective to require that all fish ponds be retro-fitted with bottom draws (as the WDNR had originally required in 1998). It may be warranted to investigate and review the WDNR's scientific evidence and WDNR procedures used to determine why a bottom draw requirement was established for Gollon Bait & Fish Farm by the WDNR in 1998. Additional research should be done on hatchery effluents and conducted at fish farms with fish farmers and other shareholder involvement. Furthermore, the findings of this study suggest that fish farms may be a preferred use for rural land and perhaps should be promoted as an alternative to other forms of development and use when the aquatic environment is considered.

7) Include any other information you feel is appropriate

None